List of all Operational Improvements in the NAS Architecture 5 database

Service Group Air Traffic Services

Service ATC-Advisory

Capability NAS Status Advisory

Operational Improvement

Current NAS Status Advisory (103301)

Pilots require NAS status updates, which are essential to safety and efficiency. These updates and information that was not readily available during flight planning are either broadcast or provided directly to in-flight aircraft by specialists at the flight service station/automated flight service station, controllers at air traffic control facilities, and personnel at airline operations centers and other facilities. NAS status includes changes to the operational status of airspace, airports, navigational aids, in-flight or ground hazards, traffic management directives, and other information. Pilots receive some NAS status information, including runway status and weather information, via digital broadcast of automatic terminal information.

Operational Improvement

Provide National Flight Information Service (103305)

Improving the ability of equipped aircraft to access aeronautical information during flight is essential. Pilots require integrated and affordable flight information services, through implementation of a national Flight Information Services Broadcast.

Capability Traffic Advisory

Operational Improvement

Current Traffic Advisory (103201)

Traffic advisories alert aircraft to potential conflicts with other objects on the surface or in flight. For example, controllers transmit traffic advisories to aircraft or other flight objects that are in the proximity of hot air or gas balloons, missile launches, or other potential hazards. Traffic advisories for aircraft on the surface include the number, type, position, and intent of the ground traffic. Controllers provide the advisories to pilots via radio.

Operational Improvement

Enhance Traffic Advisories using Digital Traffic Data (103206)

Pilots have an integrated cockpit display of traffic information (CDTI) for aircraft equipped with automatic dependent surveillance (ADS) and ground surveillance information. There is national availability of surrounding traffic information in the cockpit, including ADS - broadcast information and the rebroadcast of non-transmitting targets to aircraft.

Capability Weather Advisories Capability

Operational Improvement

Current En Route Advisory - Weather (103107)

Weather advisories alert traffic managers and controllers of hazardous weather (e.g., hail, icing, turbulence, and high winds) associated with thunderstorm activity. National Weather Service (NWS) meteorologists at each Air Route Traffic Control Center's Center Weather Service Unit and the Aviation Weather Center in Kansas City, MO, generate these advisories based on weather data from NWS and FAA sensors. Data also comes from airborne jetliners that downlink wind and temperature data via a meteorological data collection and reporting system (MDCRS) run by a communications service provider. Pilot reports (PIREP) of encountered weather are another valuable source of weather data. En Route controllers provide weather advisories to pilots via radio. Pilots also receive warnings that are recorded and broadcast via radio at selected very high frequency omnidirectional range (VOR) sites.

Operational Improvement

Current Oceanic Advisory - Weather (103114)

Common situational awareness improves by providing location and intensity of thunderstorm activity over oceanic airspace to controllers, dispatchers, and pilots via alphanumeric messages.

Operational Improvement

Current Terminal Advisory - Weather (103101)

Terminal controllers receive textual and graphical weather information. They use this information to provide pilots weather advisories of potentially hazardous weather conditions, including wind shear and microburst alerts, precipitation intensity levels, icing, and areas of low visibility, hail, lightning, and tornadoes. Controllers also transmit these advisories to pilots via radio. Pilots also receive recorded warnings that are broadcast via radio at selected very high frequency omnidirectional range (VOR) sites and on Automated Terminal Information System (ATIS). In addition to the broadcast weather advisories, pilots receive automated wind shear alerts via the Terminal Weather Information for Pilot (TWIP) system at NAS pacing airports.

Operational Improvement

Deploy FIS-B Nationally (103104)

Flight Information Services - Broadcast (FIS-B) currently enables pilots to receive text and graphical weather information via a vendor-provided service (including data link). Free access to basic weather and NAS status information are available to properly equipped aircraft. En route weather server (WARP/GWIS) will provide the FIS vendor with weather data in the future.

Operational Improvement

Enhance Meteorological Data Collection and Reporting System (MDCRS) (103116)

Additional atmospheric parameters (i.e., humidity and turbulence) become available from expanded airline fleet participation coupled with of additional parameters further improves the accuracy of weather forecast model output such as inflight icing and turbulence forecasts.

Operational Improvement

Improve En Route Weather Products (103109)

Several systems and initiatives lead to improved weather products in the En Route domain, including the tri-agency Next Generation Weather Radar system, Meteorological Data Collection and Reporting System (MDCRS), Corridor Integrated Weather System (CIWS), and the Weather and Radar Processor (WARP) (and its successor--the Global Weather Information System). More jetliners become MDCRS equipped and humidity and turbulence reports added to that of winds and temperature, improving weather model forecast output. CIWS provides tailored thunderstorm products for traffic managers to mitigate thunderstorm impacts on the busy corridor from Chicago eastward, and also enhanced Echo Top mosaic and forecast, to facilitate over-the-top routing. The Global Weather Information System (GWIS) replaces the WARP and provides enhanced forecasting tools for the CWSU.

Operational Improvement

Improve Oceanic Weather Products (103115)

Various products tailored for transoceanic flights, such as convection, volcanic ash, in-flight icing, clear air turbulence, and convection-induced turbulence, emerge from FAA-sponsored research and development. Better data link technology using ground- and satellite-based dissemination architectures speeds delivery, which enables common situation awareness (by oceanic control, airline operation center, (AOC) dispatcher, and flight deck) of the hazard along the flight path transition areas.

Operational Improvement

Improve Terminal Weather Products (103113)

Several systems and initiatives lead to improved ATC Advisory - Weather services in the terminal domain including the Automated Surface Observing System (ASOS) Ice-free Wind sensor, the ASOS Enhanced Precip ID sensor, and Weather Support to Ground Deicing Decision Making (WSDDM). Other terminal-area products and systems include wake vortex mitigation, ASOS Snow Depth sensor, ASOS 25-Kft Ceilometer, Integrated Terminal Weather System (ITWS) deployment, tech refresh for Airport Surveillance Radar-9 (Weather Systems Processor) and Terminal Doppler Weather Radar, and improved prediction of fog/low ceilings (safety and capacity).

Operational Improvement

Provide Automatic Hazardous Weather Alert Notification (103117)

Common situational awareness between pilots and controllers is enhanced via immediate, simultaneous dissemination of hazardous weather to both NAS service providers and users via voice circuits and datalink.

Operational Improvement

Support CDM with Simultaneous Hazardous Weather Notification (103112)

Common situational awareness improves through similar depiction of NAS-impacting weather to pilots, controllers, and traffic managers as SWIM facilitates near simultaneous dissemination of aviation-impacting weather to both service providers and users.

Service ATC-Separation Assurance

Capability Aircraft Airspace Capability

Operational Improvement

Manage Aircraft in Dynamic Airspace (102302)

The value of the nation's airspace for all users becomes increasingly critical as military operations, domestic commercial operations, general aviation, and, finally, space transportation vie for airspace. Airspace use/availability information is dynamic for both users and service providers; it allows them to react to available airspace to enhance flight operations for both mission and economic priorities. Automated systems provide users of properly equipped aircraft streaming information that include, for example, air traffic control clearance, current and forecast weather, notices to airmen, hazardous weather, airspace-related charts, and status of special use airspace (SUA). Airspace is designated for special use for all aviation users based on priority and availability of use. Information on SUA is widely available and highly dynamic as far as start and end times of the defined SUAs

Operational Improvement

Current Aircraft To Airspace Separation (102301)

Separation services ensure that aircraft maintain a safe distance from special use airspace (SUA), such as prohibited, restricted, and warning areas. SUA ensures safety for unique aircraft operations or prohibits flight within a specified area. Separation standards ensure that aircraft remain an appropriate minimum distance from the airspace. The standards are applied using such vehicles as regulatory publications and specific control instructions.

Capability Aircraft to Aircraft Separation Capability

Operational Improvement

Current En Route Separation (102112)

Aircraft to aircraft separation services in en route airspace ensure a safe distance is maintained between aircraft. Air traffic controllers apply separation standards defined for the different aircraft operating environments to guide pilots flying under instrument or visual flight rules. They separate aircraft under their control using standard rules for vertical, lateral, longitudinal, or visual separation. When potential conflicts exist, an air traffic controller evaluates the situation, develops conflict resolution alternatives, and alerts or issues separation instructions to the aircraft.

Operational Improvement

Current Oceanic Separation (102105)

Aircraft to aircraft separation services in oceanic airspace ensure a safe distance is maintained between aircraft. Separation minima are based on the oceanic separation and procedures of the International Civil Aviation Organization. These services are supported by a system providing flight data processing, conflict probe, and situation display for oceanic air traffic control. Separation is supported through daily development and publishing of ocean track systems. Assignment to tracks, entry times, etc., through clearance planning, provides separation along and between tracks.

Operational Improvement

Current Terminal Separation (102129)

Aircraft to aircraft separation services in terminal airspace ensure a safe distance is maintained between aircraft. Within

terminal airspace, requirements for separation vary by airspace Class. Controllers separate aircraft under their control using standard rules for vertical, lateral, longitudinal, or visual separation methods. When potential conflicts exist, an air traffic controller evaluates the situation, develops conflict resolution alternatives, and alerts or issues separation instructions to the aircraft

Operational Improvement

Evolve Oceanic Procedures to Domestic En Route Separation (102136)

Implementing enhanced communication navigation systems (CNS) and avionics capabilities results in oceanic separation standard minima and procedures becoming more like domestic en route operations and procedures. Improved oceanic automation (satellite, aircraft, surface) enables controllers to apply reduced vertical, longitudinal, and lateral separation standards.

Operational Improvement

Extend The Use Of Radar Separation Procedures To Non-Radar Airspace Using Alternative Sources Of Surveillance (102123)

Integrating surveillance sources (primary, beacon, automatic dependent surveillance (ADS)) provides expanded separation services throughout the NAS. Increasing the separation assurance coverage area is based on the aircraft transmission of position, velocity, and intent information. Additional non-radar surveillance sources (ADS) for position data, increased aircraft equipage, and enhanced automation allow reduced separation criteria to be applied in more areas of the NAS.

Operational Improvement

Incorporate Aircraft Provided Intent Data to Improve Conflict Detection, Resolution Development and Monitoring (102122)

Integrating surveillance sources (primary, beacon, automatic dependent surveillance) provides pilots expanded separation services throughout the NAS. Air traffic controllers equipped with aircraft position broadcast reports via automatic dependent surveillance receive velocity and intent data as well as position information. The addition of aircraft intent data enables the controller to apply reduced separation minima in more areas of the NAS. Full collaborative decision making (CDM) capabilities and integrated decision support systems (DSSs) increase access to the NAS for equipped users, resulting in some exclusionary airspace.

Operational Improvement

Reduce Horizontal Separation Standards -3 Miles Everywhere- to Increase Capacity and Efficiency (102117)

Multiple surveillance sources (primary, beacon, and automatic dependent surveillance) and improved surveillance data processing provide accurate position, trajectory, and intent data for aircraft to aircraft separation. Integrating these sources and providing terminal area surveillance data to the en route center increases the surveillance coverage area and availability of 3-mile separation procedures throughout the NAS.

Operational Improvement

Reduce Vertical Separation Minima Above FL290 Domestic (102128)

Expanding the use of vertical aircraft to aircraft separation standards provide more user preferred altitudes for fuel efficient, minimal-time flight tracks. This implements the Reduced Vertical Separation Minima (RVSM) program in the En Route domain of the NAS.

Operational Improvement

Shared Responsibility For Horizontal Separation (102118)

Improved avionics and new procedures allow air traffic controllers to delegate resolution responsibility to pilots when it is operationally beneficial to do so. Enhancements to automatic dependent surveillance and the traffic information system provide common situational awareness to the flight deck display. Pilots implement the airborne separation assurance service by using visual flight rule-like procedures between like-equipped aircraft to realize an operational advantage.

Operational Improvement

Use Data Messaging to Reduce Routine Service Provider Workload And Increase Flight Efficiency (102114)

Enhanced automation and aircraft equipage promote expanded use of data link for additional routine communications between controllers and pilots. Data link usage is also reducing frequency congestion. Using data link, controllers and pilots exchange routine, non-time critical messages, such as transfer of control, more efficiently and accurately.

Operational Improvement

Use Oceanic Pairwise Maneuvers And Flexible Entry Points to Increase Tactical Capacity (102108)

Improved oceanic surveillance information, satellite-based communications, and data link provide the opportunity to reduce longitudinal and lateral spacing for aircraft to aircraft separation in oceanic airspace. Improved automation increases the separation assurance coverage area in the oceanic domain based on aircraft transmission of position, velocity, and intent information. Technology improvements support multiple entry points into the oceanic tracks relieving congestion at established gateways.

Capability Aircraft-Terrain-Obstacles

Operational Improvement

Current Aircraft To Terrain / Obstacle Separation (102201)

Separation services ensure that aircraft maintain a safe distance from terrain and obstacles. Aircraft positions are derived from navigational systems, surveillance information, visual orientation, and position reports to ensure that an aircraft's trajectory remains a minimum safe distance from terrain and obstacles.

Operational Improvement

Use Improved Terrain Information To Share Responsibility For Aircraft To Terrain Separation (102203)

Flight Crews and single-pilot operations monitor cockpit information that provides increased situational awareness of position, altitude, weather, and other essential data that contribute to safety. Automated systems consolidate essential and timely information that is valuable to the pilot. Pilots receive comprehensive databases that reflect terrain and obstacles, fixed and temporary, to provide continuous updates, rather than the 28-day updates in the current architecture. Satellite position reports

show the aircrafts actual position on moving maps in the cockpit to provide pilots a more complete picture of the aircraft-to-ground environment to reduce controlled flight into terrain.

Capability Surface Separation Capability

Operational Improvement

Current Surface Separation (102401)

Separation services on the airport surface prevent taxi conflicts and runway incursions. Separation is based on radio communication, visual acquisition, notes, and monitoring to ensure that taxi clearances do not result in conflicts and to conduct conformance monitoring. At some airports, the airport surface detection equipment radar and the associated display provide increased situational awareness.

Operational Improvement

Improve Pilot Separation Assurance Functions on the Surface by Providing Targets for On-Board Displays (102408)

Automated systems provide pilots the target definition and information previously provided to controllers. Both pilots and controllers viewing high-definition target location, identification, and speed greatly enhance situational awareness for all parties. The increase in and fidelity of information provided to pilots enhance and enrich the operational moving environment of the airport surface. Automated systems display and advise the pilot of the location of vehicles and other aircraft. Automated broadcast of aircraft and vehicle position to ground sensors/receivers provides a comprehensive digital display of the runway and taxi environment. Decision support system algorithms enhance target displays, and the displays support identifying and alerting pilots that may enter into a runway incursion environment. Civil as well as commercial users utilize multifunction flight deck displays to enhance traffic situational awareness of all current traffic at the airport. Air Traffic provides air traffic management services to aircraft equipped with capability to simulate visual meteorological conditions.

Operational Improvement

Provide Enhanced Aircraft Target Data to Service Providers for Surface Movement and Runway Separation (102406)

Smaller general aviation aircraft, as well as commercial aircraft, are identified and tracked on the runway surface to provide a full, comprehensive picture of the surface environment to the controller. Automated systems display and advise the controller of the location of vehicles and aircraft. Automated broadcast of aircraft and vehicle position to ground sensors/receivers provides a comprehensive digital display of the runway and taxi environment. This complements visual observation when poor visibility or distance impairs the controllers surveillance of the airport surface. Decision support system algorithms enhance target displays, and the displays support identifying and alerting aircraft and vehicles that may enter into a runway incursion environment. Target displays and decision support systems provide high-fidelity runway incursion alerts to controllers.

Operational Improvement

Provide Enhanced Surface Target Displays to Service Provider for Surface Movement and Runway Separation (102405)

The increase in and fidelity of information provided to tower controllers enhance and enrich the operational moving environment of the airport surface. Automated systems display and advise the controller of the location of vehicles and aircraft. Automated broadcast of aircraft and vehicle position to ground sensors/receivers provides a comprehensive digital display of the runway and taxi environment. This complements visual observation when poor visibility or distance impairs the controllers surveillance of the airport surface. Decision support system algorithms enhance target displays, and the displays support identifying and alerting aircraft and vehicles that may enter into a runway incursion environment. Target displays and decision support systems provide high-fidelity runway incursion alerts to controllers.

Operational Improvement

Provide Surface Situation to Pilots and Service Providers and Vehicle Operators for All-weather Surface Operations (102409)

As target displays improve and information is enriched regarding the movement areas, automation provides the enhanced controller tools to manage airport surface traffic. The decision support system (DSS) provides for dynamic planning of surface movements to include automated event trigger information that records time-over-spot. Air traffic controllers receive DSS-enhanced aircraft and vehicle-speed information to provide intent and performance monitoring to further facilitate alerting aircraft of runway incursions and overall safety of the airport movement area. The information-rich airport surface environment includes nearby airspace with the same fidelity to complete the movement picture of arriving and departing aircraft and the airport surface. The service provider furnishes traffic management services to aircraft equipped with capability to simulate visual meteorological conditions so that they can maneuver on the surface during low-visibility and zero-visibility operations.

Service Airspace Management

Capability Airspace Design

Operational Improvement

Current Airspace Design (108101)

Airspace designs consider, among other elements, the existing design, current and projected traffic usage, radio frequency congestion, effects of airport construction, proposed and existing surface structures, and environmental factors, such as noise abatement. Airspace designs provide the aviation community the description, operational composition, and status of airspace/airport components of the NAS required to support separation and synchronization services.

Operational Improvement

Improve Airspace Design using Additional Criteria (108102)

Airspace design criteria are based on altitudes as measured by space-based navigation support. Criteria for airspace structures are developed based on the capability of aircraft to accurately fly and maintain these "true" earth altitudes versus pressure altitude. While pressure altitudes will remain the efficient choice in higher altitude cruise, in many lower altitude situations the airspace structures will be based on the space-based capability of the aircraft and the relationship to separation criteria.

Operational Improvement

Provide Design Criteria for Airspace Flight Objects (108104)

All uses of airspace evolve from the current reservation system to a common flight plan/profile for all uses. Thus a special use

airspace (SUA) activity would include the time duration and volume of airspace around the trajectory required to execute the mission. This improvement acknowledges the increased requirement for dynamic airspace restrictions with variable separation for security, military operations, Remotely Operated Aircraft, (ROA), and reusable launch vehicles, (RLV). The activity to control the entry into the system of such profiles remains an airspace function, but the actual management of the data becomes united with the flight processing system.

Capability Airspace Management

Operational Improvement

Current Airspace Management (108201)

Current airspace management assigns airspace classification to volumes of airspace. Within those airspaces the service provides develops sectorizations and routings based on the characteristics of the aircraft operating with in those airspace volumes. Airspace Management also reviews construction projects for their impact on airspace, and designates and schedules airspace for special use for activities. Designs are limited by the minimum capabilities of aircraft allowed within a class of airspace and by the limitation of automation and the management/coverage of CNS (communication and navigation systems) assets.

Operational Improvement

Expand use of RNAV/RNP Procedures (108203)

Provide airspace design changes to increase access, efficiency and capacity utilization by developing and publishing Area Navigation (RNA) and RNAV Required Navigation Performance (RNP) routings in the NAS. RNAV/RNP provides increased routing to allow more efficient routes of flight and merging of traffic, increased opportunities to manage flow with more defined and closely separated paths. Allows flows that are currently co-mingled due to lateral spacing requirements to be segregated in individual paths.

Operational Improvement

Increase Capacity And Efficiency Using RNAV (108209)

Provide airspace design changes to increase access, efficiency and capacity utilization by developing and publishing Area Navigation (RNAV) routings in the NAS. RNAV routing allows greater access to airspace and efficiency of flight by providing the service provider and user greater options.

Operational Improvement

Provide Dynamic Resectorization (108207)

Dynamic resectorization provides tools to allow for more definition of airspace configuration changes, with automated functions to evaluate and develop asset assignments. Dynamic resectorization supports system-to-system coordination of the reassignments across facility boundaries. Dynamic resectorization allows more refined mitigation of weather and flow problems than can be conducted with the multiple set of pre-defined and coordinated plans.

Operational Improvement

Provide Flexible Airspace Management (108206)

Provide expanded capabilities to utilize the multiple configurations. The capability to define and manage asset assignment (re-mapping of flight information, radar information etc, to the appropriate positions) is greatly enhanced making the use of multiple pre-defined configurations including sharing of airspace across facility boundaries possible. Includes tools to define and support the design of alternatives as well as re-mapping of flight information, radar information etc, to the appropriate positions.

Operational Improvement

Redesign High Altitude Airspace (108211)

Provide airspace designs that exploit the full advantage of the flight deck capability as well as the advanced Decision Support Tools. Sizing the volume of coverage and traffic for the service provider based on fully exploiting the capability of Area Navigation (RNAV), Requied Navigational Performance (RNP) and decision aiding. Starting first at the highest altitudes with crafting the design and procedures to reduce the required interaction between the controller and aircraft while providing flexibility to the user in planning the flight profile. Operational Description as part of the National Airspace Redesign, the High Altitude Redesign (HAR) programs focus is to develop and implement fundamental changes in navigation structure and operating methods for en route operations for the high altitude airspace environment. RNAV/RNP), and point-to-point navigation will incrementally replace the higher altitudes of the present jet-route structure. The redesign activities are founded on industry/government recommended concepts from RTCA Select Committee 192 (SC192). The goal is to provide more freedom to properly equipped users and to achieve the economic benefits of flying user selected non-restrictive routings.The redesign implementation will be done in phases and will progress based on customer equipage and technological advancement in ground based Air Traffic Control systems. The initial implementation, Phase 1, is at the very high flight levels. Additional flight levels will be added as technology and systems allow.

Service Emergency and Alerting

Capability Alerting Support

Operational Improvement

Current Emergency Alerting Support (106201)

Indirect assistance is for events and circumstances in which the response is external to the system. For example, when information is received that an aircraft is overdue or missing, emergency locator transmitter signals are received, or search and rescue services may be required. Alerting support provides the relevant information and coordinates with appropriate international, military, federal, state, and local agencies. The appropriate organization(s) then provide the direct response(s).

Operational Improvement

Enhance Emergency Alerting Support (106202)

Controllers and search and rescue support, using Global Positioning System location information and discrete aircraft identification, locate distressed or downed aircraft, through automatic dependent surveillance system-broadcast. Controllers improve their ability to assist in locating a downed aircraft and to identify and track visual flight rules flights.

Capability Emergency Assistance
Operational Improvement
Current Emergency Assistance (106101)
Direct support protects individuals and property both in the air and on the ground. Among other things, direct support includes location and navigation assistance for orientation, guidance to emergency airports, and generation of alternative courses of action.

Service Flight Planning
Capability Flight Data Management
Operational Improvement
Current Flight Data Management (101201)
All users (e.g., general aviation, commercial, military, Customs, law enforcement) submit flight plan data for processing. This includes validating flight plans; notifying users of any problems; and flight plan activation, processing amendments, cancellations, and flight plan closures. The NAS disseminates flight plan information as necessary.

Operational Improvement
Enhance Flight Data Management (101202)
Flight planning and filing up to 180 days before the day of flight receive support. Flight data processing (FDP) incorporates flight data information from the flight deck into the trajectory and conformance modeling. All flight plans are treated as trajectories with protected volumes supporting military operations as well as remotely operated aircraft and reusable launch vehicles. FDP uses volumes of interest to determine the relationship of the trajectory and the interest of service providers. Changes to flight profiles can be negotiated with a strategic planner and updated, which reduces the workload on the tactical provider. This ensures that all changes are consistent with current flow objectives.

Capability Flight Plan Support
Operational Improvement
Current Flight Plan Support (101101)
NAS users receive essential weather and aeronautical information to support flight planning. Flight planning requires such information as expected route, altitude, time of flight, available navigation systems, available routes, special use airspace restrictions, daily demand conditions, and anticipated flight conditions, including weather and sky conditions (e.g., the presence of volcanic ash, smoke, and/or birds). NAS flight plan processing provides evaluation and feedback for both domestic and international flight plans. Aeronautical information includes notices to airmen concerning establishment or condition of, or change in, any NAS component (i.e., facility, service, or procedure) or NAS hazard. Users need to receive this information in a timely manner because it is essential to flight.

Operational Improvement
Provide Full Flight Plan Constraint Evaluation with Feedback (101102)
Users' and service providers' receipt of the real-time and projected status of special use airspace promotes their ability to gain access to the area. All users and service providers receive the same level of NAS-wide information. General aviation and commercial operators receive the same level of support through in collaborative decision making. The increase in timely and accurate information lets users more predictably plan and fly the routing that meets their individual objectives.

Operational Improvement
Provide Interactive Flight Planning from Anywhere (101103)
NAS users receive interactive feedback regarding proposed flight plans based on such current constraints as special use airspace, weather, en route congestion, NAS operations, and maintenance status. Flight plan evaluation improves traffic flow and the airlines' ability to exchange information and negotiate flight plan changes in near real-time ability. Access via SWIM, (System Wide Information Management), is available from the flight deck as easily as it is from any ground connection. This is the flight deck side of management by trajectory, and it increases everyone's ability to perform conformance monitoring. Since the flight plans now accurately reflect the NAS constraints only small tactical deviations are present in NAS; all other changes are developed and coordinated electronically. Finally, in the longer-term aspects of this step, iterative trial planning becomes automated using agents.

Service Infrastructure-Information Management Service
Capability Government-Agency Support
Operational Improvement
Current Government/Agency Support (109301)
The FAA provides information and coordination services and support to other federal and state government agencies. ATC supports DoD operations, law enforcement missions, forest fire-fighting operations, and state aviation managers. ATC implements temporary flight restrictions over geographic areas for specified events and supports natural disaster relief flights, medical emergency flights, and drug interdiction flights. The FAA disseminates all available information to the appropriate agencies during search and rescue operations and to the NTSB and other entities during incident and accident investigations.

Operational Improvement
Enhance Government/Agency Support (109302)
The FAA provides information and coordination services and support to other federal and state government agencies through System Wide Information Management (SWIM). ATC supports DoD operations, law enforcement missions, forest fire-fighting operations, and state aviation managers. ATC implements temporary flight restrictions over geographic areas for specified events and supports natural disaster relief flights, medical emergency flights, and drug interdiction flights. The FAA disseminates all available information to the appropriate agencies during search and rescue operations and to the NTSB and other entities during incident and accident investigations.

Capability Monitoring and Maintenance
Operational Improvement
Current Monitoring And Maintenance (109101)

Maintaining, operating, and managing the infrastructure requires a variety of planning, engineering, analysis, repair, and

maintenance functions. It also encompasses monitoring status, real-time assessments, and implementation of systems in the NAS. Included are activities to monitor the NAS status, detect and isolate failures and outages, and perform corrective and preventive maintenance to ensure NAS operational readiness. While there are some systems that can be remotely monitored, the status of many assets is detected by periodic testing or through pilot/controller reports of loss of capability.

Operational Improvement
Increase Remote Monitoring and Maintenance (109102)
Additional capabilities provide Airways Facilities personnel A) a top-down view of a problem from a larger perspective (including the Operations Control Center [OCC] and the National Operations Control Center [NOCC]) instead of only the local view, B) increased remote maintenance, and C) intelligent automatic fault correction.

Capability Spectrum Management
Operational Improvement
Current Spectrum Management (109201)
Spectrum management secures, protects, and manages the radio spectrum for the FAA and the U.S. Aviation community. It is the focal point for management policy and plans, engineering, frequency assignment, radio interference resolution, radiation hazard, obstruction evaluation, electronic counter measures, and other National/International spectrum activities.

Service Navigation
Capability Airborne Guidance
Operational Improvement
Area Navigation and Approaches with Vertical Guidance Using GPS/WAAS (107103)
Area navigation is supported throughout the NAS using affordable Global Positioning System (GPS) based avionics with Wide Area Augmentation System (WAAS) capabilities to provide the required position accuracy along a specified direct route.

Operational Improvement
Current Enroute Navigation (107101)
Independent ground and space-based navigation systems support both area navigation (point-to-point) and flights on published Jetroutes and Victor Airways.

Operational Improvement
Current Non-precision Approach and Departure (107111)
Ground-based navigation aids provide guidance to and/or along runway centerline extended for non-precision landings and also departure guidance, per published approach and departure procedures.

Operational Improvement
Current Precision Approach, Landing and Departure (107104)
Ground-based instrument landing systems support precision approach and landings for Category I, II and III visibility and decision height minimums. These landing systems radiate precision lateral and vertical descent guidance signals that are received and processed by aircraft navigation avionics to guide the aircraft to the runway. Precision approach systems can be supplanted with marker beacons, which indicate the distance from the aircraft current position to the runway threshold, and Distance Measuring Equipment (DME).

Operational Improvement
Domestic RNP Navigation (107114)
Aircraft navigate in the NAS using Required Navigation Performance (RNP) rated avionics. RNP-based navigation ensures an aircraft's position is known within a defined airspace volume, thereby allowing decreased separation between same-RNP capable aircraft.

Operational Improvement
Oceanic Satellite Navigation (RNP-4) (107102)
Improved avionics utilize augmented or non-augmented Global Positioning System (GPS) data so aircraft can achieve Required Navigation Performance -4 (RNP-4) on oceanic routes. RNP ensures increased safety because the aircraft's position is always known to lie within a specific volume of airspace.

Operational Improvement
Provide Cat I Precision Approach and Departure Guidance (GLS) Using WAAS (107105)
The Global Positioning System (GPS) and Wide Area Augmentation System (WAAS) broadcast signals that are received and processed by aircraft avionics to provide accurate aircraft position information. The position information is sufficiently accurate throughout the NAS to support runway Category I precision approaches and departure guidance.

Operational Improvement
Provide Catagory I-II-III Precision Approaches Using LAAS (107107)
Local Area Augmentation Systems (LAAS) will support precision approaches to Category I, Category II and Category III minimums for properly equipped runways and aircraft. LAAS will support approach minimums at airports where ILS cannot meet performance requirements due to terrain, obstacle or other restrictions.

Capability Surface Guidance
Operational Improvement
Current Airport Surface Guidance (107201)
Aircraft use runway and taxiway lighting, markage, and signage for movement on an airport.

Operational Improvement
Provide Low Visibility Operations (107202)
Aircraft and ground vehicle movement on airports in low visibility conditions is guided by accurate location information and moving map displays.

Service TM-Strategic Flow

Capability Flight Day Management

Operational Improvement

Current Flight Day Management (105201)

Participating aircraft operation centers and the FAA have real-time access to current NAS status information, including infrastructure and operational factors. There is an electronic exchange of NAS status information and flight plan information, and interactive decision support tools increase NAS user and traffic manager flexibility to manage flight operations under current constraints, such as special use airspace, equipment and facility status, and weather conditions. The airlines and Traffic Management improve in exchanging information and negotiating flight plan changes in a near real-time ability (Free Flight Phase 1 activity).

Operational Improvement

Enhance Collaborative Decision Making (105205)

A more robust interactive decision support toolset increases NAS user and traffic manager flexibility to manage flight operations by interfacing with the multiple systems that provide current constraints. These include special use airspace, equipment and facility status, and weather conditions. Traffic management and airlines improve in negotiating planned equipment outages.

Operational Improvement

Provide Full Collaborative Decision Making (105207)

An interactive decision support toolset increases NAS user and traffic manager flexibility to manage flight operations. All users and traffic managers improve in exchanging information and negotiating flight plan changes. Collaborative routing enhancements improve aircraft operators' ability to flight-plan based on airspace availability and traffic managers' ability to plan responses to demand. There are slot allocation, routes, and mitigation strategies for congestion and weather, and tactical negotiation solutions of user requests are provided and their results distributed to the collaborative planning toolset.

Capability Long Term Planning

Operational Improvement

Current Long Term Planning (105101)

Establishing standard responses, such as playbooks to enable more efficient day of operations. Inputs include capacity and demand models based on airport use data, airspace for special use schedules, airline flight schedules, infrastructure status, and historical flight traffic demand information.

Operational Improvement

Enhance Sector Demand Prediction and Resource Planning (105102)

Matching sectors and staffing better to anticipated demand promotes efficiency. This includes proactively adjusting airspace and personnel scheduling to an area based on projections of shift in demand to seasonal changes, as well as city pair business adjustments by airlines.

Operational Improvement

Provide NAS Wide Sector Demand Prediction and Resource Planning (105104)

Strategic management of personnel and physical asset assignment and airspace modification are required to meet a change in systemic demand due to seasonality or airline city pair business case decisions. This includes proactively adjusting and assigning personnel to an area based on projections of shifting demand.

Capability Performance Assessment

Operational Improvement

Current NAS Performance Assessment (105301)

A manual process of analysis supported by the Post Operations Evaluation Tool (POET) to review actions taken and their effect provides input to playbooks and standard operating procedures. Performance assessment covers system status and arrival/departure delay times.

Operational Improvement

Enhance NAS Performance Assessment (105302)

Assessment evaluates performance of airport, tower, terminal radar approach control facilities, and en route facilities. The analysis highlights where throughput is constrained and becomes the basis for strategic long-term planning. Evaluations of predicted scenarios and planning provide feedback for tool development and future planning.

Service TM-Synchronization

Capability Airborne

Operational Improvement

Current Arrival/Departure Sequencing (104109)

Airborne spacing and sequencing of air traffic safely maximizes NAS efficiency and capacity in the terminal portion of the arrival and departure phases of flight. Air traffic controllers provide traffic synchronization to aircraft by monitoring the situation, making control decisions, and modifying flight trajectories to meet operational objectives and accommodate user preferences. Controllers optimize the arrival and departure portion of flight by sequencing and spacing aircraft on final approach and departure. They apply separation standards to achieve efficient use of airports by applying manual controller optimization procedures. Traffic specialists and controllers use traffic displays and flight strips to establish flow initiatives, such as reassignment of flows (arrival and departure) to runways. This includes sequencing and spacing aircraft on closely spaced, parallel runways in visual meteorological conditions and instrument meteorological conditions.

Operational Improvement

Current Conflict Probe (104103)

Airborne spacing and sequencing of air traffic safely maximizes efficiency and capacity of the NAS during the en route phase of flight. Controllers provide traffic synchronization to en route aircraft by monitoring the situation, making control decisions, and modifying flight trajectories to meet operational objectives and accommodate user preferences. They achieve this by applying manual controller optimization procedures. Controllers using traffic displays and flight strip information integrate user

preferences with separation requirements. They apply separation standards to achieve efficient use of navigable airspace.

Operational Improvement

Current Oceanic Conflict Probe (104101)

Airborne spacing and sequencing of air traffic safely maximizes efficiency and capacity of the oceanic airspace. Controllers provide traffic synchronization to aircraft during oceanic flight by monitoring the situation, making control decisions, and modifying flight trajectories to meet operational objectives and accommodate user preferences. They achieve this by applying manual controller optimization procedures. Controllers use flight strip information with an initial decision support to integrate user preferences with separation requirements. They apply separation standards to achieve efficient use of navigable airspace.

Operational Improvement

Current Tactical Management Of Flow in the En Route for Arrivals/Departures (104115)

Proper spacing and sequencing of air traffic maximizes NAS efficiency and capacity in the arrival and departure phases of flight. Controllers provide traffic synchronization to aircraft by monitoring the situation, making control decisions, and modifying flight trajectories to meet operational objectives and accommodate user preferences. They achieve this by applying manual controller optimization procedures. Traffic specialists and controllers use traffic displays (radar and enhanced traffic management system) and flight strips to establish flow initiatives, such as assignment to alternative arrival flows or miles-in-trial requirements.

Operational Improvement

Improve Wake Vortex Prediction (104113)

Controllers require a more accurate prediction of wake vortex conditions, caused by aircraft arriving or departing from airports.

Operational Improvement

Manage Arrival and Departure Flows by Crossing and Merging Virtual Streams (104120)

Placing aircraft into a virtual stream improves the flow of traffic in the en route envirnoment. In addition, controllers receiving descent profile information for planning an efficient flow enhance flight descent profiles for arriving aircraft.

Operational Improvement

Optimize Runway Assignments - Terminal (104114)

Controllers improve sequencing and spacing of arriving aircraft with tools for better managing the runway assignment for aircraft in the terminal. This includes automation to generate instructions for aircraft heading and speed based on the addition of aircraft performance parameters to the algorithms and the addition of wake vortex information. This improves the terminal controller's ability to accommodate user requests for flight profiles and runway assignments while still optimizing flow. Pilots improve capabilities to follow other aircraft, fly approaches, and land on closely spaced parallel approaches in poor weather conditions. Additionally, a path from runway to en route stream is established to improve the flow of departure aircraft which includes using speed and heading advisories.

Operational Improvement

Provide Conflict Probe with Multi-Objective Data Linked Resolutions (104105)

Conflict Probe improvements enhance controllers ability to accommodate pilot requests for flight plan changes by providing conflict detection and trial planning in en route operations.

Operational Improvement

Provide National Traffic Management of Support Flow in the Enroute for Arrivals and Departures (104117)

Controllers and traffic managers, using arrival scheduling tools to synchronize traffic controlled by en route centers, improve traffic flow to airports. This includes improving delivery of aircraft to arrival fixes for better sequencing onto runways. With addition of widespread, real-time distribution of NAS data, the Multicenter Traffic Management Advisor is no longer needed.

Operational Improvement

Synchronize Traffic for Flexible Entry into Oceanic Tracks (104102)

Controllers equipped with decision support systems to improve in-trail climbs, descents, and passing maneuvers for properly equipped aircraft improve user access and efficient use of oceanic airspace.

Capability Surface

Operational Improvement

Current Surface Traffic Management (104201)

Controllers, airline ramp tower personnel, and pilots provide surface synchronization using procedural and visual means. Controllers issue taxi clearances and instructions to provide optimum and predictable flows of traffic by communicating with pilots and vehicle operators on the airport surface. At peak times, controllers manage flow by using dedicated taxiways for arrivals or departures. They establish sequences to support the most expeditious use of departure runways or flow into ramp areas.

Operational Improvement

Enhance Surface Traffic Management (104206)

Improved decision support tools integrated into future automation systems use aircraft intent, velocity, and position information, provided by future surveillance and communication systems, for more accurate current position information and traffic synchronization planning. The tools also expand collaboration between controllers, dispatchers, and traffic flow managers, resulting in enhanced management of aircraft and vehicular traffic on the airport surface.

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